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shown Dr. Packard that his definition and limitation of that group is extremely faulty. Dr. Packard's new family, Gampsonychidæ, is apparently valid, and belongs, where he has placed it, among the Schizopoda. In his paper on this group we observe that he regards his Syncarida as an ancestor of the schizopods. It is not easy to see how our knowledge of crustacean embryology supports such a view, for in development a schizopodal condition usually precedes the single-branched appendage. So far as the plates show, there is nothing except the telson to separate the family Anthracaridæ from the true Caridea, or to indicate that it differs from any existing group. The telson, however, is greatly different, approaching most closely in its appearance to that of the existing genus Euceramus of Stimpson.

The paper on the "Xiphosura of the Carboniferous" is the best of the series, containing as it does, in addition to the description of new forms, a *résumé* of our previous knowledge. It would seem, however, that the reference of *Cyclus americanus* to the genus Cyclus is hardly warranted. Except in the possession of a circular outline, Cyclus and the form in question have little in common. With regard to the other forms described or redescribed by Dr. Packard, but little needs to be said. The relegation of Euproops into synonymy seems warranted, but the sub-order Synziphosuridæ, with its four new families, should have, at most, but family rank. For the Merostomata and Trilobites Dr. Packard proposes a class, Podostomata, the definition of which could be very seriously criticised. The most prominent point, however, to be mentioned is that Dr. Packard, in this new group, actually renames one of his own groups, which in turn was well enough named before. A slight variation in the limits of the Gigantostraca of Haeckel and Dohrn makes this group synonymous with the later Palæocarida of Packard, while, so far as we can see, Packard's Palæocarida and Podostomata are absolutely identical.

In closing this review, we may call attention to a tendency on the part of our author to rename things already well named, and his pages fairly bristle with "arthrosome," "bænopod," "urosome," "cephalula," and the like,—all synonymous with previously-coined and widely-used terms. The learning of this new nomenclature, in order to read intelligently one of Dr. Packard's later productions, is, as suggested by Col. Theodore Lyman in another connection, extremely like sawdust-swallowing,—neither palatable nor nutritious.

**Thomas on Mammalian Dentition.**[1]—The reader who expects to find in this memoir a history of the evolution of Mammalian dentition will be disappointed, for it embraces only a history of the evolution of the milk-dentition and the nature of dental succession. To this end the author has written a very useful paper, and illustrates it with numerous instructive diagrams and figures. He first describes the dentition of the Dasyuridæ, and shows how the third, or, as he calls it, the fourth, superior premolar has disappeared, leaving but three in the genera Dasyurus and Sarcophilus. As Mr. Thomas calls the fourth superior premolar in the Marsupialia a true molar, he finds only two left in the genera named, and, believing that four premolars must be accounted for, he endeavors to show that another premolar has been lost in those genera. He concludes that the second is the missing one, and reaches this opinion by finding on one side of a single skull of *Phascogale dorsalis* a supernumerary tooth between the first and second premolars. In our opinion, this supernumerary tooth, if anything more than an abnormality, can only represent a former tooth of a series of five. Similar teeth have been observed in the inferior series in *Miacis edax* Leidy, and *Coryphodon latidens* Cope. It is quite unnecessary to complete the number of four premolars, since four are accounted for, after the replacement of the third, which is wanting in Dasyurus. The fourth is of molariform structure, and has been therefore regarded as a true molar by Flower and Thomas. The fact that it is in the genus Triïsodon and probably others (as Mioclænus, where there are four inferior premolars), shed and succeeded by a premolariform permanent tooth, is conclusive as to the homology, as I have pointed out.[1] Mr. Thomas finds my description of this genus "incomplete and confusing," and the reason why he does so is apparent from the above description of his views.

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[1] On the Homologies and Succession of the Teeth in the Dasyuridæ, with an attempt to trace the History of the Evolution of Mammalian Teeth in General. By Oldfield Thomas (British Museum). Philos. Transac. Royal Society, 1887, p. 443.

Mr. Thomas believes that the milk-dentition is not a remnant of a primitive succession derived from Reptilian ancestors, but holds, with Professor Flower, that it is a superaddition gradually introduced in the evolution of the Mammalia. The lack of milk-teeth other than the third premolar (or its homologue), from the Jurassic Mammalia, strongly supports this view. The fact that the temporary fourth premolar is in most placental Mammalia more complex than its permanent successor, is also in favor of this view, so far as it goes; and the fact that this complex tooth is permanent in the implacentals still further supports the opinion of Flower. On this view it appears that the placental has added to the implacental milk-dentition one tooth posteriorly and two anteriorly. It then looks as if the deciduous dentition consisted of primitive teeth retarded in their protrusion by more precocious ones. This is essentially Mr. Thomas's explanation,—which approximates that of Baume, who, however, differs in the method of statement. Baume[1] regards the milk-dentition as expelled by the crowding of the germs of the permanent teeth in the jaws, and so caused to protrude earlier. The opinion of Thomas is preferable, since teeth of accelerated growth will certainly retard or repress germs of slower growth, and not weaker germs expel stronger germs, as Baume's theory requires. Moreover, milk-teeth appear at normal age for teeth, while the permanent ones are late. Mr. Thomas finds difficulty in accounting for such precocity and such crowding. Mechanical evolution furnishes the explanation. It is due to the shortening of the jaws; and this is a consequence of the development of the canine teeth from use, and the consequent forward movement of the masseter muscle and its insertions.[2]

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[1] Final Report U. S. Geol. Survey Terrs., iii. Bk. i. p. 270, 1885.

It may be observed that the unnecessary terms Prototheria and Eutheria, which are generally ascribed to Professor Huxley in England, were really introduced by Professor Gill.[3]—*E. D. Cope.*

**Jordan's Science Sketches.**[4]—When Dr. Jordan undertakes the description of a fish his language is the language of science; when he turns his pen to the popularization of scientific subjects he still retains his former conciseness, but at the same time he manages to introduce many epigrammatic sentences and no little quiet humor, the latter the more enjoyable from the thoroughly natural manner in which it is used. His recent book, "Scientific Sketches," is made up of a series of articles, lectures, and addresses, most of which have appeared separately before, but which are welcome in permanent shape. Four of the sketches relate to fishes, dealing with the life of a salmon, the habits of the "John Darters," a sketch of the salmon family, and the dispersion of fresh-water fishes. Three are biographical sketches, the subjects being Rafinesque, Poey, and Darwin. The "Story of a Stone" is a bit of geological history for young readers; the "Ascent of the Matterhorn" is the least scientific, the "Nomenclature of Birds" the least popular, of the essays. The last essay in the volume, "The Evolution of the College Curriculum," is by far the most valuable, but to be fully appreciated it should be read in the light of the experiment in collegiate instruction which is being tried at the Indiana University, of which Dr. Jordan is the president. Dr. Jordan's idea is that a college should provide both the facilities for a general culture and also for detailed study; that, while teaching the elements of

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[1] I only know this from Schlosser's description, Morphologishes Jahrbuch, 1886, p. 110.

[2] See Cope, The Mechanical Origin of the Sectorial Dentition, Proceeds. Amer. Assoc. Adv. Sci., 1887.

[3] Arrangement of the Families of Mammals, Smithsonian Contributions to Knowledge, 1872, pp. v., vi.

[4] Science Sketches. By David Starr Jordan. Chicago: A. C. McClurg & Co. 1887.